Standard C-6: The student will demonstrate an understanding of the nature and properties of various types of chemical solutions.

Supporting Content Web Sites

SparkNotes
http://www.sparknotes.com/chemistry/
This website contains concise descriptions of chemistry principles. Also includes sample problems.
All indicators for C-6

Science Line
http://www.wpbschoolhouse.btinternet.co.uk/page03/AcidsBasesSalts/AcidBaseQmcF.htm
Multiple choice questions related to calculating pH and pOH.
C-6.8

Homework High
http://www.channel4.com/learning/microsites/H/homeworkhigh/science/index.jsp
This website provides answers to general chemistry questions.
All indicators for C-6

American Chemical Society, chemistry.org
http://center.acs.org/education/olympiad/2003/practice_test/index.html
On-line practice tests on solutions and other chemistry subjects.
All indicators for C-6

ChemTeam
http://dbhs.wvusd.k12.ca.us/webdocs/ChemTeamIndex.html
The ChemTeam provides study resources in all standard topics for students in high school and Advanced Placement chemistry.
All indicators for C-6

Rader's CHEM4KIDS
http://www.chem4kids.com/
This website provides students with supporting material for most general chemistry topics. It is well organized and easy to follow.
All indicators for C-6

Visualization and Problem Solving for General Chemistry (Purdue University)
http://www.chem.purdue.edu/gchelp/
This website contains very clear descriptions of chemistry topics.
All indicators for C-6

Virtual ChemBook

http://www.elmhurst.edu/%7Echm/vchembook/index.html
This site has very clear explanations of most general chemistry topics.
All indicators for C-6

Advanced Placement Digital Library (Rice University)
http://apdl.rice.edu/DesktopDefault.aspx?tabindex=4&tabid=34
This site provides excellent resources for all general chemistry topics. There are activities, tutorials, videos, virtual and real labs, and so much more.
All indicators for C-6

The ChemCollective: For Students
http://www.chemcollective.org/students.php
This site uses Applets to allow students to complete virtual labs and other activities.
All indicators for C-6

Suggested Literature

Sacks, Oliver. (2002). *Uncle Tungsten: Memories of a Chemical Boyhood*. New York:Vintage.
ISBN: 0375704043
Oliver Sacks uses stories of his childhood to describe applications of chemistry and the history of chemistry. There are many applications of the solutions, acids and bases, and mixtures.
C-6.2, C-6.5, C-6.7, C-6.11

Schwarcz, Dr. Joe. (2002). *The Genie in the Bottle: 67 All-New Commentaries on the Fascinating Chemistry of Everyday Life*. Ontario:Owl Books.
ISBN: 0805071385
Dr. Schwarcz uses really-life examples to describe applications of chemistry. The focus is mainly on food and health sciences. There are many applications of solutions, mixtures, acids and bases.
C-6.2, C-6.5, C-6.7, C-6.11

Burreson, Jay and Couteur, Penny Le. (2004) *Napoleon's Buttons* (pb reprint). New York:Tarcher.
ISBN: 1585423319
Napoleon's Buttons is the fascinating account of seventeen groups of molecules that have greatly influenced the course of history. There are many applications of solutions, mixtures, acids and bases.
C-6.2, C-6.2, C-6.5, C-6.7, C-6.11

Gonick, Larry. (2005) *The Cartoon Guide to Chemistry*. New York:Collins.
ISBN: 0060936770
This book is a refreshingly humorous but thorough ancillary guide to general chemistry. It covers all areas of general chemistry.
All indicators for C-6

Wertheim, Jane. (2000). *Illustrated Dictionary of Chemistry*. London:Usborne Books.
ISBN: 0746037945
Excellent resource book for all topics in general chemistry.
All indicators for C-6

Houk, Clifford C., and Post, Richard. (1996*). Chemistry: Concepts and Problems: A Self-Teaching Guide*. New Jersey: Wiley.
ISBN: 0471121207
This book has easy to follow examples and explanations of chemistry principles. It covers all general chemistry topics.
All indicators for C-6

Moore, John T. (2002). *Chemistry For Dummies.* New Jersey: For Dummies.
ISBN: 0764554301
This book has easy to follow examples and explanations of all general chemistry topics.
All indicators for C-6

Asimov, Isaac. (1979). *A Short History of Chemistry*. Westport, CT:Greenwood Press Reprint.
ISBN: 0313207690
From the use of metals by prehistoric man to the alchemical experiments of medieval and Renaissance man to the complex chemical skills of contemporary man, Asimov traces the development of this building block of our technological world. There are many applications of solutions, mixtures, acids and bases.
C-6.2, C-6.2, C-6.5, C-6.7, C-6.11

Cobb, Cathy, and Fetterolf, Monty L. (2005). *The Joy of Chemistry: The Amazing Science of Familiar Things*. New York:Prometheus Books.
ISBN: 1591022312
This book uses real-life examples to explain the science of chemistry. Most general chemistry topics are covered.
All indicators for C-6

Williams, Linda. (2003). *Chemistry Demystified*. New York:McGraw-Hill Professional.
ISBN: 0071410112
This book supports the learning of most general chemistry topics. It uses a step-by-step method to help students understand concepts.
All indicators for C-6

Suggested Steamline Video Resources

Elements of Chemistry: Acids, Bases, and Salts
All segments
ETV Streamline SC
Video gives descriptions and examples of acids and bases. Includes explanation of pH.
All segments are applicable. 20 minute video.
C-6.6**,** C-6.7, C-6.8

Chemistry Connections: Acids and Bases Defined
All segments
ETV Streamline SC
Video gives basic descriptions of acids and bases. Also gives definitions.
All segments are applicable. 20 minute video.
C-6.6, C-6.7, C-6.8

Simply Science: Water: Highway of Life
All segments
ETV Streamline SC
4. brief description
All segments are applicable. 27 minute video.
C-6.1, C-6.2

Simply Science: Combustion and Replacement Reactions
All segments
ETV Streamline SC
Video focuses on types of reactions, including precipitation reactions.
All segments apply. 27 minute video.
C-6.2, C-6.12

Chemistry Connections: Acid-Base Titrations and Concentration Calculations
All segments
ETV Streamline SC
Students in video work through an analysis of household ammonia using a known acid as titrant.
All segments are applicable. 29 minute video.
C-6.4, C-6.9

Physical Science Series: Mixtures and Solutions
Solutions (01:55) (segment 7)
Solubility (04:15) (segment 8)
ETV Streamline SC
Video shows the creation of solutions and consider the concepts of solubility and rate of dissolving. The following terminology and concepts relating to solutions are addressed: homogeneous and heterogeneous mixtures, solute, solvent, saturated solutions, and unsaturated solutions.
Solutions (01:55) (segment 7)
Solubility (04:15) (segment 8) C-6.1, C-6.2

Chemistry Connections: Explaining the pH/pOH Scale
All segments
ETV Streamline SC
Reveals that the pH scale is an easy way to express hydrogen ion concentration. Provides a definition of pH and shows how it is calculated. Explains a pH/pOH scale and observes the mathematical relationship between pH and pOH.
All segments are applicable. 29 minute video.
C-6.6, C-6.8

Science Investigations Physical Science: Investigating Chemical Reactions
Solutions (06:14)
Solutions: Bees and the Concentration of Sugar in Honey (02:03)
Solutions: The Concentration of Sucrose in Maple Syrup (04:11)
ETV Streamline SC
Video gives real-life examples of solutions and their concentrations.
Solutions (06:14)
Solutions: Bees and the Concentration of Sugar in Honey (02:03)
Solutions: The Concentration of Sucrose in Maple Syrup (04:11)
C-6.1, C-6.4

Physical Science: Chemistry
The Chemistry of Crime Solving (04:25) (segment 2)
ETV Streamline SC
Video discusses the use of chemistry in forensics. Solutions must be separated to be analyzed.
The Chemistry of Crime Solving (04:25) (segment 2)
C-6.11

Life Science: Forensics
All segments
ETV Streamline SC
Video discusses forensics and how chemistry is applied in this field. Solutions must be separated to be analyzed.
All segments are applicable. 20 minute video.
C-6.1, C-6.11, C-6.15

Career Connections

Forensic chemists
"Forensic chemists apply knowledge from diverse disciplines such as chemistry, biology, materials science, and genetics to the analysis of evidence found at crime scenes or on/in the bodies of crime suspects. The field is a combination of criminalistics and analytical toxicology. Criminalistics is the qualitative examination of evidence using methods such as microscopy and spot testing, whereas analytical toxicology looks for evidence in body fluids through a range of instrumental techniques from optical methods (UV, infrared, X-ray) to separations analyses (gas chromatography, HPLC, and thin-layer chromatography). Mass spectrometry is also frequently used since it provides the strongest evidence in court"
(http://www.chemistry.org/portal/a/c/s/1/resources?id=171b0f1254ac11d7ecbe6ed9fe800100)

Laboratory Technician
Clinical laboratory testing is crucial to detecting and diagnosing diseases. Laboratory technicians perform most of these tests. These technicians examine and analyze body fluids, tissues and cells. They look for bacteria, parasites and other microorganisms. They analyze the chemical content of fluids, match blood for transfusions and test for drug levels in the blood to show how a patient is responding to treatment.
People in this field use automated equipment and sophisticated, expensive instruments capable of performing a number of tests simultaneously. They also use other lab equipment, including microscopes and cell counters.
Lab technicians also maintain glassware, instruments, logs and record books. They also troubleshoot and help with special projects."
(http://jobprofiles.monster.com/Content/job_content/JC_Science/JSC_LifePhysicalandSocialScienceTechnicians/JOB_LaboratoryTechnician/jobzilla_html?jobprofiles=1)

Environmental chemist
"Environmental chemist" is a general term. This work may focus on collecting and analyzing samples, developing remediation programs, changing production processes to yield a more environmentally friendly product, providing expert advice on safety and emergency response, or dealing with government regulations and compliance issues.
(http://www.chemistry.org/portal/resources/?id=c373e9f5bf5914ed8f6a4fd8fe800100)
They must understand concepts of acids and bases, solutions, concentration, mixtures, and analysis of samples.

Industrial Safety and Health Engineers
An industrial safety and health engineer might have to do the following tasks:
- Devises and implements safety or industrial health program to prevent, correct, or control unsafe environmental conditions.
- Provides technical guidance to organizations regarding how to handle health-related problems, such as water and air pollution.
- Conducts plant or area surveys to determine safety levels for exposure to materials and conditions.

- Conducts or directs testing of air quality, noise, temperature, or radiation to verify compliance with health and safety regulations.
(http://www.xap.com/Career/careerdetail/career17-2111.01.html)
They must understand concepts of acids and bases, solutions, concentration, and mixtures.